MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
ENVIRONMENTAL ASSESSMENT

WESTSLOPE CUTTHROAT TROUT RESTORATION: EXPERIMENTAL TRANSFER OF HATCHERY WESTSLOPE CUTTHROAT TROUT (M012) TO THE SOUTH FORK JUDITH RIVER ABOVE A CONSTRUCTED FISH BARRIER

PART I. PROPOSED ACTION DESCRIPTION

A. Description of water body and action:

Non-hybridized westslope cutthroat trout (WCT) *(Oncorhynchus clarkii lewisi;* M012 strain*)* from Montana Fish Wildlife and Parks Anaconda fish hatchery are proposed to be stocked in the South Fork Judith River (SF) above a constructed fish barrier near Bluff Mountain Creek upstream to Deadhorse Creek in the SF headwaters (Figure 1).

Receiving Water:

Name:	South Fork Judith River	Location:	T11N R10E Sec 18
	Water Code: 161820		
County:	Judith Basin		

B. Agency Authority for the Proposed Action:

- The Montana Fish, Wildlife & Parks (FWP) "...is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects...." under statute 87-1-702.

- The overall goal of WCT management in Montana as stated in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999) is: "…to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations."

C. Estimated Commencement Date: August, 2007

Estimated Completion Date: October, 2008

Current Status of Project: A man-made concrete barrier was constructed just downstream of the mouth of Bluff Mountain Creek in late summer of 2006. Removals of non-native rainbow trout, brook trout, and hybrids (westslope cutthroat X rainbow X Yellowstone cutthroat trout) began in late 2006 after barrier construction. Removals of non-native rainbow trout, hybrids, and brook trout will continue through late summer of 2007, and brook trout removals will further continue through fall of 2008.

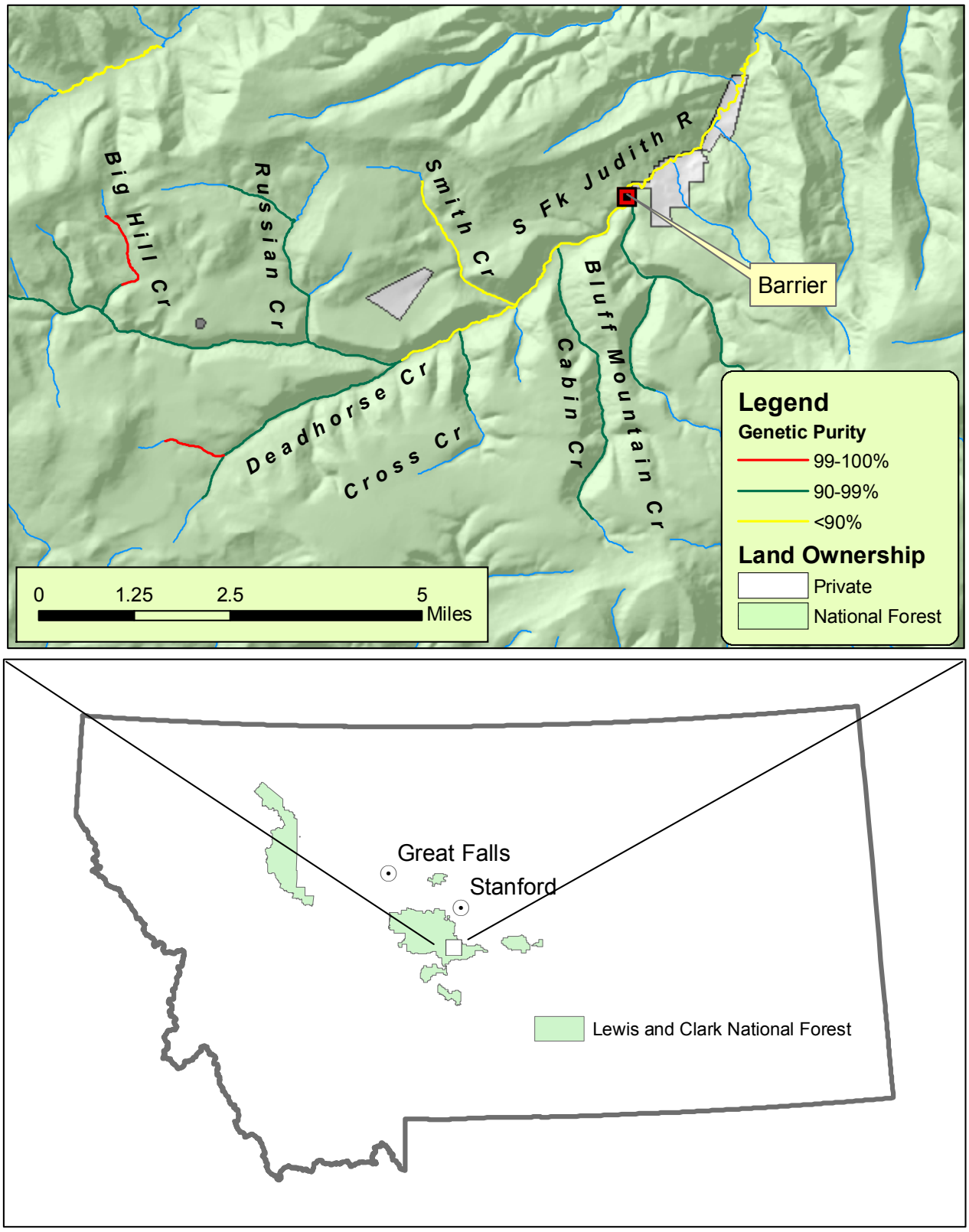

Figure 1. South Fork Judith River and vicinity within Montana.

E. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

1. Summary of the Proposed Action:

The upper South Fork Judith River (SF) is a second order stream that combines with the Middle Fork Judith River to form the mainstem Judith River. Streams throughout the Upper Judith drainage were stocked extensively with rainbow trout, brook trout, and Yellowstone cutthroat trout from the early 1900's into the 1990's (FWP 2003). Nearly all stream stocking of trout was discontinued by the mid-1990's. The upper reaches and tributaries of the SF hold slightly hybridized (generally < 5%) westslope cutthroat trout (WCT; *Oncorhynchus clarkii lewisi*). Currently, most of the SF downstream of its confluence with Deadhorse Creek is dominated by highly hybridized fishes and rainbow trout (Figures 1 and 2). The SF downstream of Hay Canyon to the confluence with the Middle Fork Judith (approximately 3.5 miles downstream of the SF barrier) is a dry channel but flows during the spring of most years.

To stop continued hybridization and upstream colonization by non-native fishes, a conceptual design for a fish barrier was developed in 2002. Funding was obtained in 2003 for design and construction of the fish barrier (Future Fisheries, Trout Unlimited, and Montana Trout Foundation). In 2004, NEPA (USFS 2004) was completed with a "finding of no significant impact." Design of the barrier and an EA for removal of non-native fishes was completed in 2005 and construction of the barrier was completed in 2006.

After construction of the barrier, highly hybridized fishes and brook trout were removed from 2 miles of the mainstem SF and 2 miles of lower Bluff Mountain and Cabin creeks (Environmental Assessment completed in 2005; FWP 2005). Current genetic information in the SF (Leary and Powell 2007) indicates a cline of hybridization exists with more highly hybridized fishes in lower reaches and less hybridized fishes in headwater reaches (Figure 2). Actual percentages of hybridization could not be obtained from samples collected in 2006 because the samples appeared to contain a mixture of non-hybridized WCT and hybrids, but fish could not reliably be assigned at the individual level to one of these categories.

We plan to remove non-native brook trout and hybrids from the aforementioned areas and an additional 12 miles of stream in the mainstem SF, Bluff Mountain, Cabin, Smith, Cross, and Deadhorse creeks with backpack electrofishing equipment during 2007. Removals in the lower SF will require two backpack shockers moving upstream in tandem. Smaller tributaries and the upper SF will be shocked with one backpack shocker moving in an upstream direction.

Initially, it was hoped that recolonization of areas where brook trout and hybrid trout were removed would be natural, and the bulk of colonizing fish would come from non-hybridized and slightly hybridized fishes further upstream in the drainage. Removals in 2006 revealed that brook trout numbers in the lower SF have expanded substantially since 2000 (Shepard 2001, Moser et al. 2006). Up to 20 % of captured fish in some reaches of the lower SF in 2006 were brook trout. Since brook trout have been shown to be competitively superior to WCT and can reproduce rapidly (Dunham et al. 2002; Peterson et al. 2004), empty habitat may quickly be colonized by brook trout rather than by immigration and reproduction of non-hybridized and slightly hybridized WCT. In addition, electrofishing efficiencies (defined as the percentage of fish captured over one pass) typically do not exceed 80% especially in large complex habitats like the SF. Hypothetically, if we were to remove 90% of rainbow trout and hybridized fishes from the 16 miles of stream, and we captured a total of 16,000 fish, we would miss close to 2,000 fish. The contribution of these 2,000 fish to future levels of genetic introgression in the SF Drainage is unknown but may preclude us from reaching the management goal of less than 5% introgression.

We propose to stock the mainstem SF two miles downstream from the confluence with Deadhorse Creek (near Smith Creek; Figures 1 and 2) with hatchery WCT (M012 Strain) at levels corresponding to approximate densities of fish removed with electrofishing during 2006 and 2007. We may also stock the lower reaches of some downstream tributaries (Bluff Mountain, Smith, and Cabin creeks). Stocking densities will be determined based on removals conducted in 2007. Preliminarily, we propose stocking 5,000 to 10,000 1.5" fish in the fall

of 2007 and 5,000 to 10,000 3 to 4" fish in the spring of 2008. Microsatellite data will be used to monitor the genetic contribution of these introduced fish to the SF population over time. Fin clips will be collected from fifty M012 fish prior to stocking. In addition, samples will be collected from areas of the SF from which we don't currently have microsatellite data (i.e., Bluff Mountain and Cross creeks). The goal of stocking is to prevent rapid colonization of empty habitat by brook trout and to override the genetic contribution ("swamping") of remaining hybrids and rainbow trout missed during electrofishing with large numbers of non-hybridized WCT of hatchery origin. Near replacement of hybridized fishes by stocking non-hybridized WCT of hatchery origin has proved to be successful in some lakes in western Montana (Leary et al. 2006). Although the exact mechanism is unknown, competitive interactions between hatchery and wild fish may have resulted in the majority of the observed effects. Use of eyed eggs in remote site incubators (RSI's) to release fry was considered but rejected because of likely heavy predation at RSI outlets by remaining brook trout.

Stocking of non-hybridized hatchery WCT from hatchery stocks of Columbia River origin into waters near local populations of WCT in the Missouri River drainage poses some risk of outbreeding depression and a loss of local genetic variation (Gilk et al. 2004; Wang et al. 2002). These risks are mitigated by several factors:

1) Hybridized WCT and rainbow trout currently in the system are genetically more divergent from local WCT populations than the proposed hatchery strain of WCT, and the risk of outbreeding depression and amounts of genetic divergence are expected to be positively associated (Edmands and Timmerman 2003).

2) Hybridization in the system is continuing and without intervention remaining populations of non-hybridized WCT will likely eventually become introgressed with rainbow trout.

3) Non-hybridized hatchery WCT may stray less than hybrids (Hitt et al. 2003).

4) Genetic differences between Columbia and Missouri river stocks of WCT account for a small proportion of the overall amount of genetic variation detected in the taxon (Leary et al. 1998). Thus, stocking hatchery fish of Columbia origin poses about the same risk of outbreeding depression as stocking fish of Missouri origin in the SF (also see comment 13 c and e, pages 8 and 9 of this document). We would prefer to use hatchery WCT of Missouri origin (i.e., Sun Ranch). Unfortunately, the Sun Ranch brood stock does not currently have the production capabilities to provide the number of fish necessary for a project of this magnitude.

2. <u>Purpose and Need for the Proposed Action:</u>

The westslope cutthroat trout is ranked as S2 (imperiled because of rarity or because of other factors demonstrably making it very vulnerable to extinction throughout its range) by the Natural Heritage Network and the State of Montana. Major threats to WCT include competition and hybridization with non-native rainbow trout (Leary et al. 1995; Hitt et al. 2003), competition with brook trout (Dunham 2002; Peterson et al. 2004), and isolation of remaining non-hybridized populations above barriers in short headwater sections of stream. These small isolated populations are at risk of extinction from catastrophic events (e.g., fire and drought) and may eventually suffer negative consequences of inbreeding (Wang et al. 2002).

Non-hybridized WCT are thought to occupy about 8% of their historic range in the western United States (Shepard et al. 2003), and less than 3% of their historic range in northcentral Montana within the Missouri River drainage (Moser et al. 2006). Current survey and inventory work has documented about 8 stream miles and 5 populations of non-hybridized WCT and 40 miles and 16 populations of < 5% introgression in the entire Judith drainage, including the South Fork, Middle Fork, Lost Fork, and Yogo drainages (Moser et al. 2006). The proposed restoration of WCT to 25 miles of stream represents less than 3% of total suitable trout habitat in the Judith drainage, but represents a significant increase in the amount of habitat occupied by non-hybridized or slightly hybridized WCT. Sixty to eighty percent of suitable habitat is currently occupied by brook trout, rainbow trout, hybrids between WCT and rainbow or Yellowstone cutthroat trout, and brown trout.

Currently, the mainstem SF is comprised almost entirely of hybrids (Figure 2). There is a cline of increasing genetic introgression from the SF at Russian Creek to the constructed fish barrier at Bluff Mountain Creek (Leary and Powell 2007). Headwater populations, as late as 2003, appeared to contain significant numbers of non-hybridized individuals. Genetic introgression and the proportion of hybrids compared to non-hybridized WCT, however, have been increasing since genetic sampling began in 1984. In 2004, samples from upper Deadhorse Creek revealed that three out of 18 individuals were highly hybridized immigrants and the remainder appeared to be non-hybridized WCT (Wright and Leary 2004; Figure 2). These data indicate that highly hybridized fish have recently begun moving into SF tributaries. If nothing is done, all WCT in the SF will likely eventually become hybridized. In addition, hybridization levels will necessarily increase with a "ratcheting up" of introgression as highly hybridized immigrants spawn with slightly hybridized or non-hybridized headwater fish.

Projects which restore large drainages (25 to 50 miles of connected habitat) are key to securing WCT populations over the long term (>250 years). Opportunities for protection and restoration of large WCT population aggregates are extremely limited in northcentral Montana because of land ownership issues, degree of environmental degradation, and challenges of controlling or removing firmly established non-native trout species. Large projects (i.e., South Fork Judith and Cherry Creek in the Madison Drainage) will always carry a risk of re-invasion by non-native species, either through illegal introductions or passage at high flows. The barrier project protects the WCT populations in the SF from continued hybridization with rainbow trout while maintaining connectivity between tributary and mainstem populations in approximately 25 miles of stream. The proximity of the protected area in the SF to human use and access will increase the future risk of small illegal introductions of non-native fishes. In addition, the recurrence interval of large magnitude flows (25 year flows ≈ 2,500 cfs) is conducive to the infrequent passage of small numbers of large non-native fish. After project completion, the protected populations of WCT in the upper SF will likely always be slightly hybridized with rainbow trout. To date, most WCT restoration projects have focused on small non-hybridized populations because of time and funding constraints. The current goal of the SF project is a compromise aimed at maintaining a WCT metapopulation that has most of the physical and ecological attributes of a native WCT fishery while accepting limited levels of introgression with non-native rainbow trout. In light of this compromise, we think it would be beneficial to stock hatchery WCT from a geographically remote region (i.e., fish from west of the continental divide) to decrease introgression with rainbow trout and prevent displacement by brook trout. FWP will continue to pursue and promote other projects (most at a smaller scale) that restore or protect non-hybridized WCT populations throughout northcentral Montana.

3. Benefits of the Project:

- Decrease in levels of hybridization in the SF above the fish barrier at Bluff Mountain Creek to less than 5%.

- Prevention of expansion of non-native brook trout throughout the SF Drainage.

G. Other Local, State, or Federal agencies with overlapping jurisdiction

N/A

H. Agencies Consulted During the Preparation of the EA

USDA Forest Service, Lewis & Clark National Forest

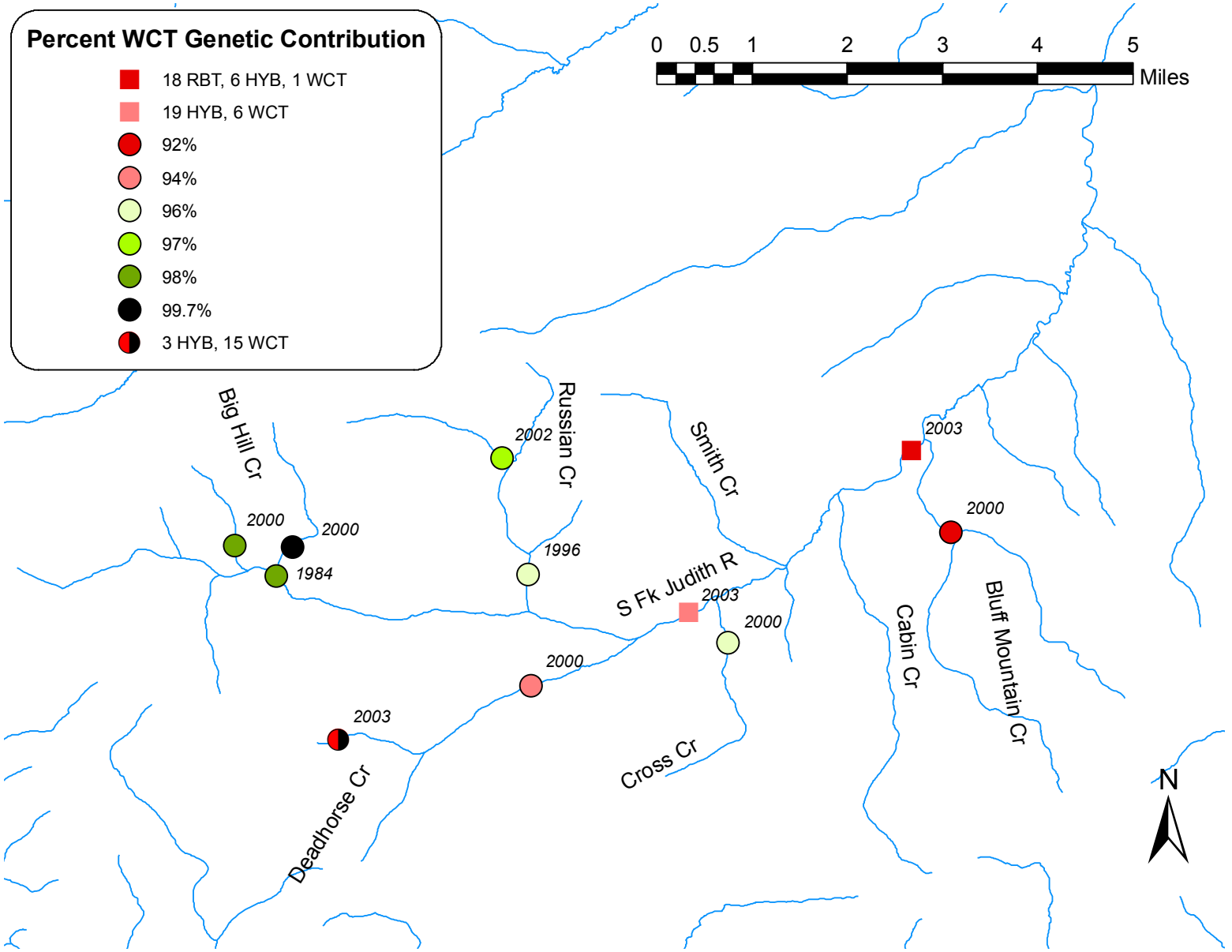

Figure 2. Levels of genetic introgression and year samples were collected in the South Fork Judith River (allozyme and PINE sampling). Some samples from 2000 were collected altitudinally and pooled (Deadhorse Cr. and Bluff Mountain Cr.)

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

5. FISH/WILDLIFE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?				X	NO	5b
c. Changes in the diversity or abundance of non-game species?		X				
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: Stocking of non-hybridized hatchery WCT derived from stocks of Columbia River origin into waters near local populations of WCT in the Missouri River drainage poses some risk of outbreeding depression and a loss of local genetic variation (Gilk et al. 2004; Wang et al. 2002). These risks are mitigated by several factors:

1) Hybridized WCT and rainbow trout currently in the system are genetically more divergent from local WCT populations than the proposed hatchery strain of WCT, and the risk of outbreeding depression and amounts of genetic divergence are expected to be positively associated (Edmands and Timmerman 2003).

2) Hybridization in the system is continuing and without intervention remaining populations of non-hybridized WCT will likely eventually become introgressed with rainbow trout.

3) Non-hybridized hatchery WCT may stray less than hybrids (Hitt et al. 2003).

4) Genetic differences between Columbia and Missouri river stocks of WCT account for a small proportion of the overall amount of genetic variation detected in the taxon (Leary et al. 1998). Thus, stocking hatchery fish of Columbia origin poses about the same risk of outbreeding depression as stocking fish of Missouri origin in the SF (also see comment 13 c and e, pages 8 and 9 of this document). We would prefer to use hatchery WCT of Missouri origin (i.e., Sun Ranch). Unfortunately, the Sun Ranch brood stock does not currently have the production capabilities to provide the number of fish necessary for a project of this magnitude.

12. CULTURAL/HISTORICAL RESOURCES Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Destruction or alteration of any site, structure or object of prehistoric historic or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?				X		12d

Comment 12d: This project will help preserve slightly introgressed westslope cutthroat trout, the State Fish of Montana, and the only trout native to the upper Missouri River.

13. SUMMARY EVALUATION OF SIGNIFICANCE Will the proposed action, considered as a whole:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources, which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?				X		13c and e
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?				X		13c and e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)				X		13f
g. List any federal or state permits required.						

Comment 13c and e: Recommendations from the Upper Missouri River WCT Committee (Leary et al. 1998) for preservation of WCT and experimental transfer of WCT include:

- "We do not now recommend that [hatchery or wild fish] WCT be introduced into waters containing or connected to waters that contain a pure WCT population unless the existing population is the source of the fish"

The proposed action deviates from this recommendation. The risks associated with the action are mitigated by the factors described in **Comment 5b.**

- "Translocations would likely occur from either the nearest population or a population inhabiting habitats most similar to the proposed restoration site"

The proposed action cannot be completed with wild, nearest neighbor fish. The numbers of stocked fish required to have a "swamping" effect or to displace brook trout would exceed by several orders of magnitude the number of fish that could be obtained from nearest neighbor fish.

- "For slightly hybridized WCT populations the Committee recommends that habitats supporting these populations be protected. Prior to the replacement of any slightly introgressed population with a 100% population, an extensive genetic sampling program must be completed throughout the range of the introgressed population to confirm that no 100% pure populations exist in the area"

Extensive genetic sampling has occurred in the SF Drainage. Sampling has indicated that some non-hybridized WCT exist in headwater areas. Sampling has also indicated that rainbow trout and hybrids are rapidly colonizing these headwater reaches because of the lack of intermediate barriers. Samples collected from the furthest reaches of Deadhorse Creek revealed that highly hybridized fish had reached this area as early as 2003. Anecdotal and published (Hitt et al. 2003) data have shown that without barriers to upstream migration drainages with a robust source of hybrids will eventually become hybridized and most likely will eventually consist of hybrid swarms where all individuals are hybridized.

Comment 13f: This proposal may produce some organized opposition from non-governmental organizations. Full disclosure of the impacts of the proposed action along with impacts of the no-action alternative should help in communicating the necessity of this project in restoring and maintaining slightly introgressed populations of WCT to the upper SF.

PART III. ALTERNATIVES

Three alternatives were considered during preparation of the Environmental Assessment.

Alternative 1 - No Action.

Under the "No Action" alternative, hatchery WCT would not be stocked in the SF. Some less hybridized fish could be moved from headwater areas to downstream mainstem areas where fish have been removed. The numbers of fish moved (≈ 200 to 500 juvenile and adult fish) would likely be insufficient to override brook trout colonization dynamics and would have a minor effect on remaining hybridized fishes. In this alternative, brook trout would potentially rapidly recolonize the lower reaches of the SF and more rapidly displace WCT in headwater reaches. If this occurs, removals of brook trout would likely need to continue for several years until WCT reestablish themselves. In addition, under this scenario, hybrids and rainbow trout missed during removals may produce a significant undesired contribution to the genetic structure of the SF fishery and the management goal of 5% introgression likely would not be met.

Alternative 2 - Proposed Action

The proposed action involves stocking hatchery WCT (10,000- 20,000 total over two years) in the mainstem SF Judith River near the confluence of Smith Creek

The predicted benefits of Alternative 2 include:

- Decrease in levels of hybridization in the SF above the fish barrier at Bluff Mountain Creek to less than 5%.

- Prevention of expansion of non-native brook trout throughout the SF Drainage.

Alternative 3 – Piscicide removal of non-native fishes

Piscicide removal of non-native fishes was considered after discovery of the recent expansion of brook trout in the mainstem SF. Throughout the NEPA process for construction of the SF barrier, electrofishing removal was specified as the method to be used to remove highly introgressed fishes from the project area. Generally, piscicides are used in projects where a complete kill of all non-native fishes is desired. In the case of the SF, a complete kill of non-native fishes was not necessary because limited introgression was accepted as part of the management goal. The ongoing risks of limited passage of large fish at high flows and the potential for illegal transport of live fish makes attempting a complete removal of fishes using piscicides unnecessary. In addition, the prevalence of private property directly below the SF fish barrier would make treatment using piscicides socially and politically difficult.

Brook trout present a separate management problem that came to light after initial removals in 2006. There is no guarantee that the use of piscicides would eliminate all brook trout in the drainage and complete removal of brook trout would likely require chemical treatment of far more of the headwater tributaries than desired. We hypothesize that by stocking hatchery WCT into the lower reaches of the SF; future displacement of WCT by brook trout may be prevented.

In the future, if electrofishing removals and stocking do not meet the goal of < 5% introgression and/or brook trout significantly displace WCT throughout the SF drainage, then piscicide treatments or additional mechanical removals may be pursued.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit westslope cutthroat trout in the Judith drainage with minimal impact on the physical, biological, or the human environment.

B) Public Involvement.

This EA will be posted on the FWP internet site (http://fwp.mt.gov/publicnotices/), and mailed directly to interested persons. Any interested citizen will be encouraged to contact FWP to discuss the proposal.

C) Duration of the comment period?

The comment period is 30 days. Public comment will be accepted through May 31, 2007

D) Name, title, address, and telephone number of the Person Responsible for Preparing the EA Document.

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